

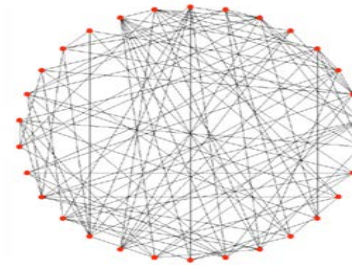
Problem

- **parallel optimization:** team of optimization algorithms works in parallel to solve an optimization problem
- excessive parallel communication causes a computational bottleneck
- high performance computing is not effectively utilized for optimization

Research Question: What is the optimal team composition and communication structure/frequency for a given high performance computing system and problem domain?

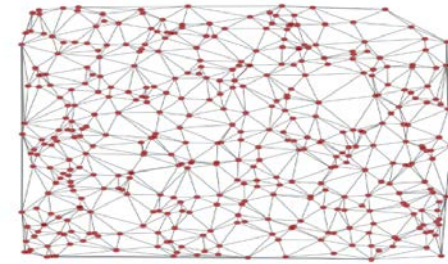
Innovation

Before



- inefficient communication between algorithms
- poor scalability on large parallel systems (+10000 cores)

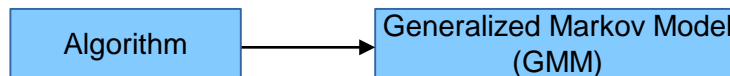
Proposed Solution



- optimize communication topology to boost performance
- **fast and reliable** solvers for large scale applications that are tuned for performance at scale

Approach

1. map algorithms to theoretical models that predict performance



2. Optimize communication topology and team composition with theoretical models to maximize performance

Objective: Establish and test models of algorithm communication strategies that are optimal and scalable on high performance computing platforms (+10000 cores).

Impact

- provide new computational methods that can efficiently utilize future large-scale computing systems (exascale)

